

Background

Online data-intensive (OLDI) services such as Google Now, Apple Siri, and IBM Watson provide answers to questions formed using natural language. Although these services are widely used, K-12 students are rarely introduced to concepts relating to them. A lack of early exposure to these concepts force the chances of students developing academic or career interests relating to OLDI concepts to rely on the exposure they may receive during their pursuit of higher education.

The Ed Watson educational package is a proposed solution to counteract the lack of exposure at the K-12 level.

Ed Watson introduces middle school students to CS concepts including:

- Big data
- Natural Language Processing (NLP)
- Grammatical tagging
- Inverted indexing

Ed Watson uses a 30 minute lecture presentation and an interactive Jeopardy! game to introduce students to these concepts. The interactive Jeopardy! game demo allowed students to compete against a computer player that uses NLP to answer questions along with them.

Curriculum and System Design

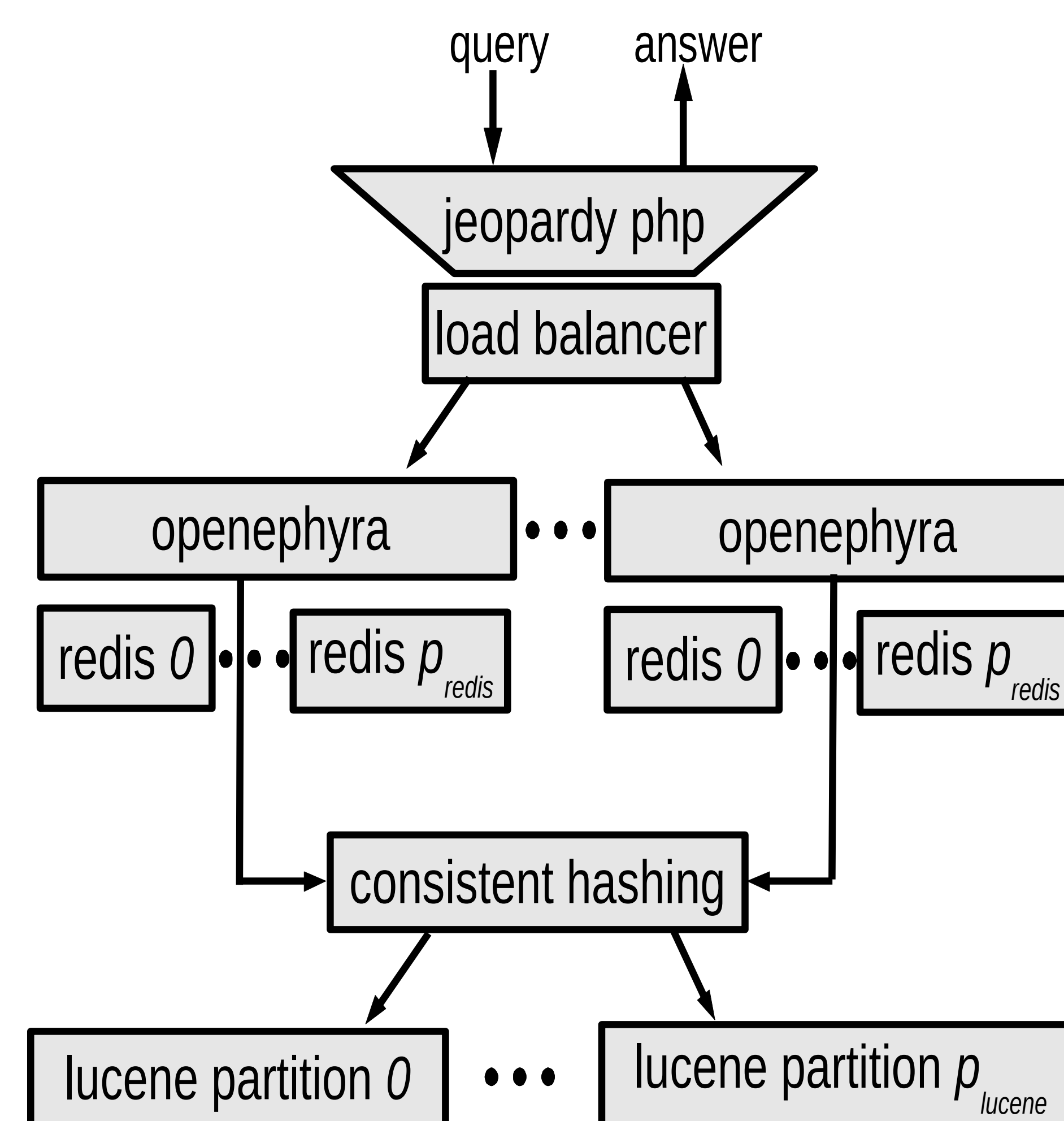
The Ed Watson curriculum package includes the following features:

- The slides and game can be presented in less than an hour, matching the length of middle school classes
- In-game feedback highlights OLDI concepts, strengthening educational goals
- Response time limits keep students engaged and reveal trade offs in energy usage and answer quality.

The Ed Watson Jeopardy! game system uses:

- 1 PHP/Apache compute node
 - 1 OpenEphyra compute node
 - 4 Redis compute nodes
 - 4 Lucene compute nodes
- Each node has a 2.2 GHz processor and 2GB RAM.

System Design



Gameplay

Fiction	History	Dystopia	People	Fantasy
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Who was chosen as the Receiver in The Giver?

Ed Watson Says:

JONAS

Ed Watson Says:

[1] Jonas
[2] Rosemary
3 seconds

NLP DIAGRAM

INV. INDEX DIAGRAM

Outreach Event (Initial Demonstration)



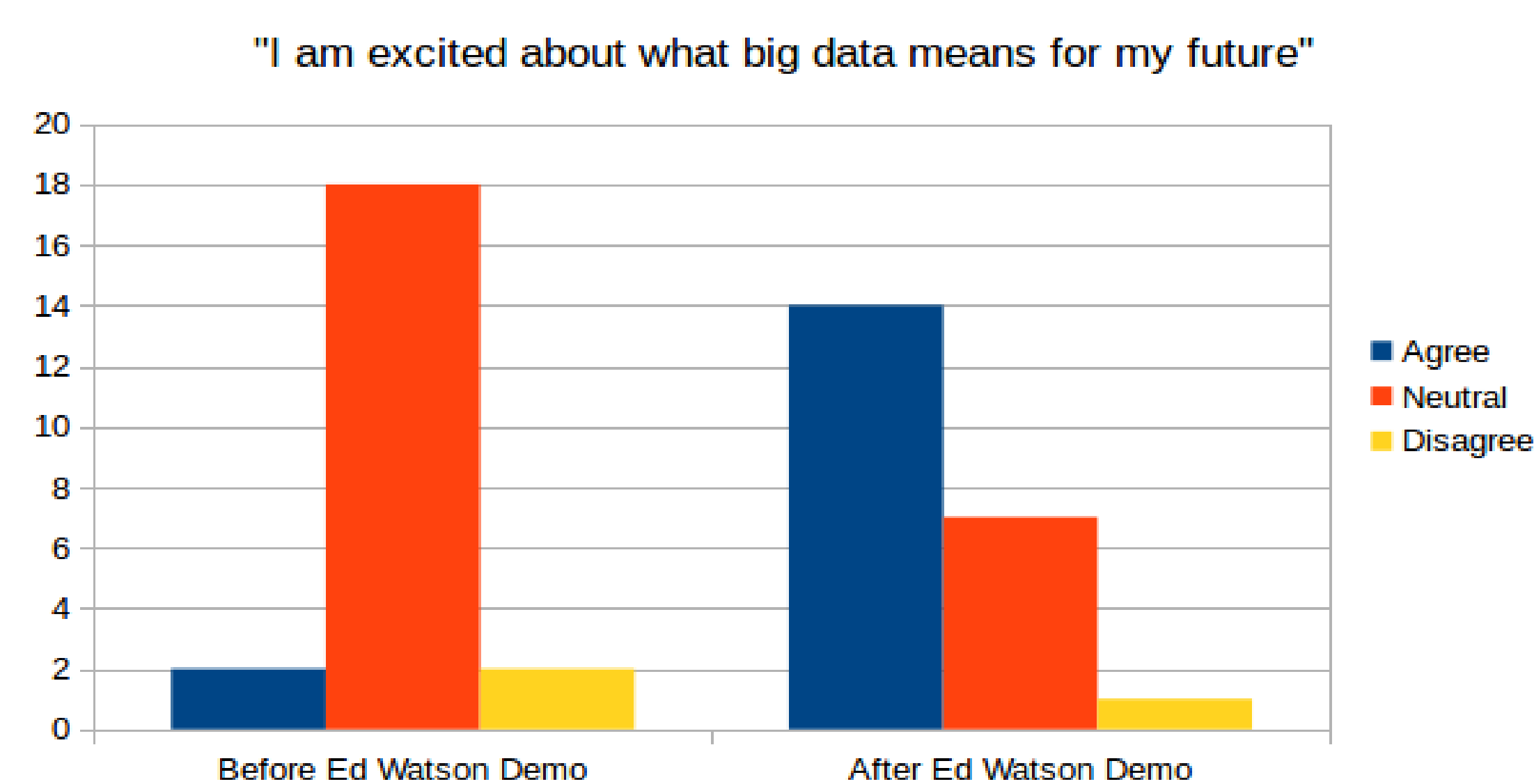
Students raising their hands to answer Jeopardy! questions during the interactive game play portion of Ed Watson.

Professor Stewart explains game play rules to 7-8th graders with Stephanie Muhammad (left) and Felicia Sawyer (camp host, middle).

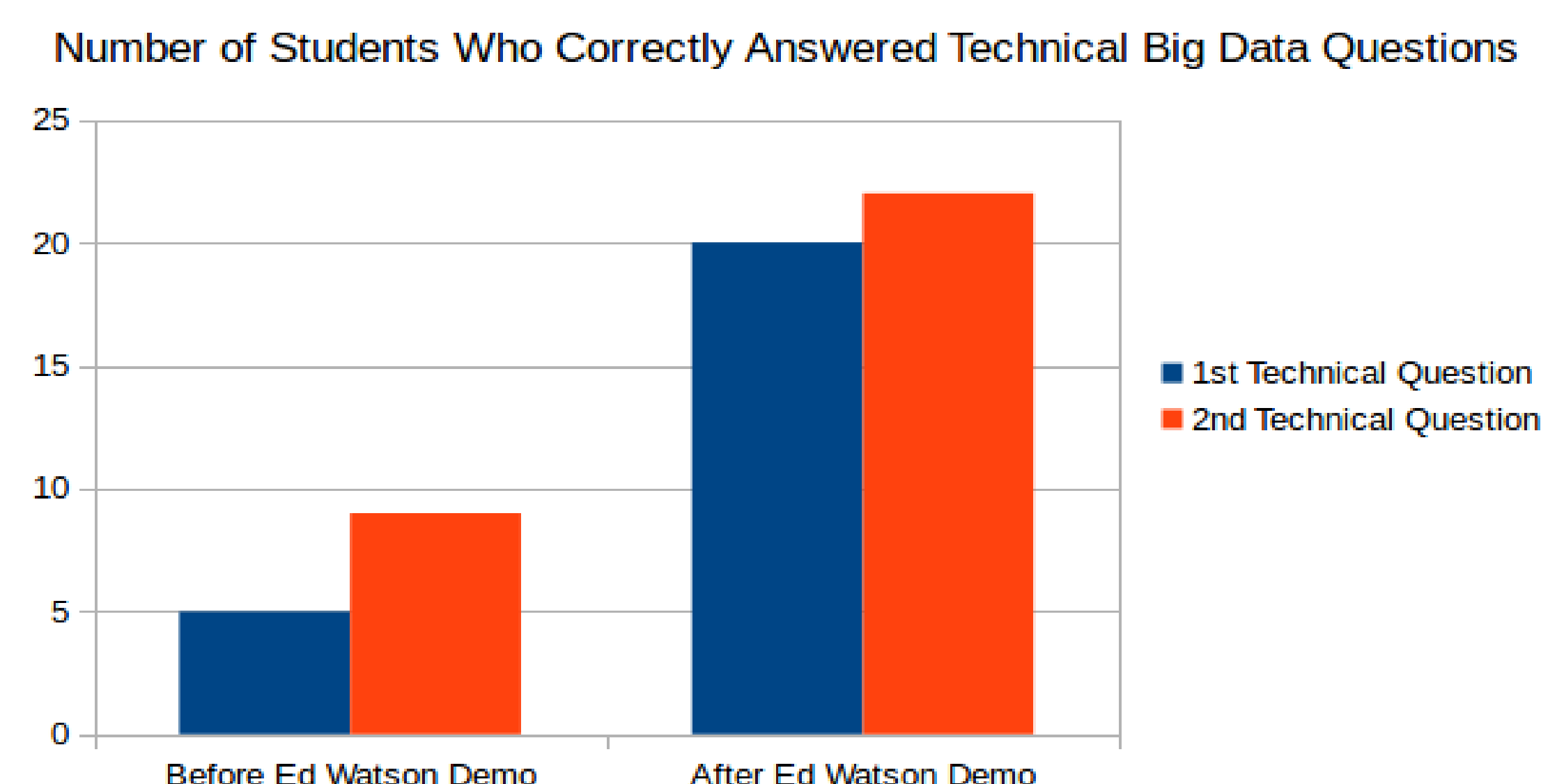


Early Results

The Ed Watson package was demoed to a group of 22 middle school students at the Camp Engineer outreach program.



54% increase in the number of students who expressed excitement in big data



60.5% increase in the number of students who correctly answered technical questions relating to big data

Future Work

The results of the Ed Watson demo showed that OLDI concepts can be taught to K-12 school students that do not have detailed computer science backgrounds. Future implementations of the package can be tailored to include undergraduate and graduate students. The package could then be used to encourage students pursuing higher education to also pursue OLDI-related paths.

Additional functionality could be added to the package to make it a more comprehensive teaching tool. These additions include:

- A database that allows teachers to store classroom information.
- An interface to allow instructors to easily add their own Jeopardy! questions and categories.
- An automatic statistic gathering tool to allow instructors to gather more information about the questions their students answered correctly and their various response times.

Aside from the additions mentioned above, additional demonstrations of the educational package will also be completed. This will allow for the collection of more results to further determine the usefulness of the Ed Watson package.